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ABSTRACT

This paper reviews the key recommendations of the New York State Education Department's Regents-approved statewide learning technologies plan. Strategies for addressing recommendations pertaining to "producer-consumer forums," "development of model staff development programs," and "technology applications for at-risk learners" are described. Also provided is a report on current State Education Department programs relating to distance learning and efforts to forge multiple state agency planning of a statewide telecommunications infrastructure. Future policy issues on the need to conduct a review of current laws, regulations, and funding mechanisms to enhance the provision of technology aid to local educational agencies are noted. (Author/EW)

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Learning Technologies and Telecommunications in New York State: A Plan to Meet the Challenge

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Learning Technologies and Telecommunications in New York State: A Plan to Meet the Challenge

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Learning technologies and telecommunications systems have made a major impact upon New York State educational and cultural institutions during the previous half-decade. The rapid acquisition of computer, video, and telecommunications technologies by the State's public and nonpublic schools illustrates the trend toward technology infusion within the educational system. For example, data on school district acquisition of computers gathered annually by the Department of Education's Information Center on Education indicates that the total public/nonpublic schools had acquired 69,484 microcomputers during the 1984-1985 school year. This number increased dramatically to 106,214 micros during the next 1985-86 year, which represents a 52.9 percent increase.

In the area of cultural education, the Department provides approximately $20 million annually to the public television and radio network to acquire quality television programming for transmission to educational and cultural institutions. The New York State Library supports and maintains its own computer-based telecommunications network linking the State Library with 49 authorized transmission sites and providing an interface with the Regional Medical Library Networks around the state for interlibrary loan transactions. The New York State Science and Technology Foundation funds seven Centers of Advanced Technology at $1 million per year for four years. The Centers conduct applied research in the technologies through partnership efforts with research universities, industry, and state government. The 15 statewide district offices of vocational rehabilitation have incorporated computerized vocational interest and values clarification tools, a computer data base of labor market information, computer software tutorial programs, adaptive technology, and video production to offer enhanced services to disabled youth and adults.

The New York State Board of Regents, in recognition of the vital need to implement the technologies effectively and appropriately within the curriculum and programs of the educational and cultural sectors of the State, created in late Fall 1982 the Center for Learning Technologies. The Center was charged with the mission of developing a strategic plan to assure quality planning of technology and telecommunications across schools, libraries, museums, vocational rehabilitation institutions, public television and radio networks, and postsecondary institutions. The plan, which was developed during 1983-84 and unanimously approved by the Board of Regents in May 1985, represents a strategic vision of the future impact of the technologies upon education and the current legislative and policy directions that must be implemented now to address the future.

Learning Technologies and Telecommunications in New York State: Action Recommendations

The statewide technology plan consists of a number of proposed "action recommendations" that serve as a framework for formulating specific agenda and operational plans to implement the technologies in those sectors for which the Department has responsibility - elementary and secondary education, cultural education, vocational rehabilitation, and higher education. The Regents recommendations address three priority goals for education.

Excellence

Interactive learning technologies must be used to achieve quality within the educational system and these technologies must reflect the highest standards.

Equity

Technological resources, including the information conveyed by these technologies, must be equitably distributed to all individuals, groups, institutions, and regions.

Efficiency

Interactive learning technologies must be employed to achieve greater efficiency in the use of educational resources and enhanced professional productivity.

The recommendations were specifically derived from a study of key technology issues and discussions Center staff held throughout 1984 with technology leaders from every State Educational Agency. The technology issues are research and development, staff development, quality instructional materials, technology integration, and telecommunications. The recommendations require the Department to:

- Focus learning technology and telecommunications efforts on districts ranking in the lowest 10 to 15 percent on the Department's statewide examinations and on those with high dropout rates. In addition, develop technology specifically aimed at the needs of low-income, minority and disadvantaged populations.

- Assure minimal competencies and knowledge in the use of new technologies through teacher certification requirements and the development and delivery of model teacher training programs to targeted populations.

- Work with hardware and software producers to develop materials to allow access to the new technologies by the physically handicapped, learning disabled and developmentally delayed.

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- Recommend legislation for 1986-87 to increase access to technology and increase staff development opportunities for districts and institutions serving low-wealth and minority populations.

- Develop a research and development agenda to serve as a basis for seeking state, federal, foundation and community support for projects and pursue new alliances and expand existing ones with regional, state and national organizations.

- Expand producer-consumer relationships to enhance the quality and usefulness of learning technology materials being developed.

- Expand demonstration projects and staff development opportunities for educators.

- Assess the technological needs of districts and do an annual data collection to monitor progress.

- Arrange for statewide volume discounts for hardware and software.

- Propose legislation to provide financial incentives for educators pursuing advanced learning technology training and to support those working on project development.

- Assess needs and build telecommunications networks to link schools, colleges, universities and various state agencies.

Department Legislative Initiatives, Policies and Programs for Implementing the Action Recommendations

During the year following the May 1985 Board of Regents approval of the plan, the Center for Learning Technologies worked with the major program offices of the Department, the intra-Departmental Learning Technologies Task Force, and an external Regents Advisory Council on Learning Technologies on the development of legislative initiatives and activities to implement each of the 15 action recommendations. The following examples illustrate the scope of these activities:

Recommendation 2. Stimulate Producer-Consumer Forums

- On June 18, 1985, the Center for Learning Technologies hosted with Apple Computer, Inc. a Publisher's Software Forum attended by 60 national software publishers. The purpose of the Forum was to brief publishers on new Departmental curriculum plans and to explore ways in which computer software might be matched with curriculum goals and objectives. A major result of this Forum was the agreement of the publishers to "bundle" software products across disciplines and to match the objectives of the products with the content goals of the New York State K-12 curriculum.

Recommendation 4. Develop Model Learning Technology Staff Development Programs

- The Center for Learning Technologies Staff Development Program and computer training facilities developed 43 Technology Training Institutes for a variety of field-based constituencies. Approximately 700 educators received training on the technologies.

- A pilot workshop on the use of video in the schools is being developed by the Center for presentation in Summer 1986. A workshop manual will be published to enable replication throughout the State. The workshop will use a "train-the-trainers" model in order to train the nearly 71,000 teachers who are currently using video production as an instructional technique.

Recommendation 6. Focus Learning Technologies on Institutions in Need

- The Department's Public Broadcasting Program has undertaken several initiatives to develop full state broadcasting coverage to ensure that public television and radio are available to all citizens and to enhance equitable dissemination of programming:

  - Ongoing addition of television/radio translators.

  - Replacement of old transmission antennas with new equipment to extend broadcast range.

  - Greater availability of cable television.

  - Addition of two radio stations by 1986.

  - Planning of two additional public television stations for the North Country and Eastern Long Island.

  - Establishment of a second video channel in the Buffalo region.

Recommendation 8. Work with Constituencies on Staff Development Programs

- The Center produces monthly, hour-long teleconferences which are aired by all New York State public television stations. The broadcast teleconferences represent a major staff development capacity for delivering priority education issues and new mandates, programs and positions to New York State educators in a cost-effective manner. The Center also disseminates each teleconference in video cassette format which expands access to the issues.

- **Interactive Television Cable Project.** This project, spearheaded by the Pleasantville Union Free School District, with the involvement of six other school districts, a postsecondary institution, and a BOCES, was established to provide Advanced Placement courses to schools facing limited enrollment problems by using an existing cable network serving all participating schools. Modestly funded in 1984-85 for 35,000, with an increase in 1985-86 to 50,000, the sites were all interconnected by American Cable Systems, a local cable franchise, with monitors, cameras, and microphones installed in classrooms of the schools. Several AP courses were transmitted during the 1984-86 school years.

- **Network for Instructional Television.** The Nassau BOCES is developing a strategic plan to extend range of broadcast coverage of four ITFS channels, with FCC licenses held by Network for Instructional Television, and two ITFS channels, with licenses held by Nassau BOCES, to include all institutions in the five boroughs of New York City, all institutions in Long Island, all institutions within Northern New Jersey, all institutions in Westchester County, and all in Southern Connecticut. Also, two satellite earth stations and a production studio will be installed and entered into the network to provide programming originating at BOCES and satellite-receive programming. It is intended that the enhanced network will broadcast twenty hours of telelearning programming per week in support of educational curriculum priorities and services of the institutions served by the network.

Technical Assistance and Legislation for Distance Learning

Several Department activities and legislative initiatives have been undertaken during the 1985-86 school year to provide technical assistance and a base of statewide funding in support of planning, technical assistance, implementation, and operations of current and future distance learning projects.

- The Center for Learning Technologies developed several initiatives during 1985-86 to enhance field awareness of the potential applications and benefits of distance learning networks. For example, Center staff produced a Distance Learning teleconference aired over the public television network on February 4, 1986, which visually depicted several operating New York State distance learning projects and was seen by an audience of 50,000 persons. The Learning Technology Fair VI, which was held on February 21 and 22, 1986, and attended by 1,000 persons, presented several distance learning sessions and workshops. Center staff are developing a publication, *Television Technology and Telecommunications In New York State: A Publication on Instructional Television, Video Production and Distance Learning*, which will be distributed in Fall 1986. In July, 1986, the Center's Video Production Program Management area will host a two-day video production workshop for fifty teachers, to include the development of materials for replicating the workshop

throughout the State. Center staff have provided technical assistance to the twenty-six current Distance Learning pilot projects in the form of liaison activities, planning assistance, and program review. Center staff are also exploring the potential educational applications of several new, satellite-based distance learning technologies in cooperation with the private sector.

- In preparation for the 1986 legislative year, the Center for Learning Technologies staff has held substantial discussions with the staff of the New York State Legislative Commission on Rural Resources. This on-going process, which began in December of 1985 and will continue until mid-1986, will consider the preparation of legislation which will provide allocations for local schools and BOCES to support planning, technical assistance and the operation of distance learning projects. To date, the Commission has introduced a bill which provides for state management of current local activities and support for model course development for distance learning.

- The Efficiency Study Grant program for 1985-86 school year funded twelve projects to study the implications of distance learning networks. $140,000 was allocated for these twelve projects, which included the participation of 57 school districts and several BOCES. This program will continue to fund the studies of telecommunications and distance learning networks undertaken by school districts in the 1986-87 school year.

Multiple-State Agency Planning of a Statewide Telecommunications Infrastructure

The effective planning of distance learning networks across the State must be understood in the larger context of developing New York State's telecommunications infrastructure. In fact, many of the distance learning projects could be more effectively and efficiently implemented provided there existed at the State Government level a single authority for managing a statewide telecommunications system, fostering inter-agency planning, and leveraging this effort to acquire telecommunications technologies at a significant price discount. While this authority or integrated planning effort has not been fully accomplished to date, the Center for Learning Technologies has pursued in cooperation with other state agencies a number of initiatives that hold promise for enhancing the state's development of a comprehensive "digital thruway." Briefly, some illustrations of these efforts are:

- Legislation has been introduced which would create an Office of State Communications Management for the purpose of developing and managing a coordinated communications system for use by State agencies and local governments. This proposed legislation would provide a centralized approach to the acquisition and leasing of additional communications equipment at a greatly reduced cost.

- Further legislation has been introduced which will create a temporary State commission on educational telecommunications

technology to prepare a plan for the adequate provision of educational technology programs for the State's elementary and secondary schools.

- The Governor of New York State, as Chairman for the Northeast Governor's Coalition, has proposed a regional state-of-the-art telecommunications system which would employ a fiber optics cable network placed along the Northeast's 4,489 mile interstate highway system. This fiber optic network is capable of carrying voice, data and video transmissions by laser beams through special glass fibers with enormous speed and clarity.

- The Center for Learning Technologies managerial staff is involved with the telecommunications planning efforts of the Office of the Lieutenant Governor, which focused on the State's telecommunications infrastructure; the Office of General Services Telecommunications Task Force, which is exploring the possibility of establishing a state agency-wide telecommunications network; and, the New York State Research Network Policy Committee, which is designing a supercomputer network. In addition, the Center has provided research and background information on telecommunications capacities to the Legislative Commission on Expenditure Review, which is currently involved in the exploration of the telecommunications capacities intended for and managed by State agencies. The Center has also provided technical assistance to the New York State Department of Tax and Finance for a complex computer-driven telephone communications system.

Future Directions

There has been substantial progress made during the 1985-86 year in implementing the Regents action recommendations related to distance learning networks and other interactive learning technologies within the educational and cultural institutions of the State. However, the State Education Department is currently examining a number of key policy issues that may require the introduction of new laws or the revision of existing laws to ensure that the educational system can be responsive to new learning needs of a citizenry brought about by the rapid evolution in the technology industry and the impact of technologies upon formal educational delivery systems. Two examples of key policy issues, which have been addressed by a Regents Advisory Council on Learning Technologies, are as follows:

1. <u>There must be a review of the current laws, regulations, and institutional mechanisms for providing state aid to local schools to acquire the learning technologies for instructional applications</u>. Unfortunately, the current laws and procedures, which were introduced in the 1960's, failed to anticipate the rapid evolution of new computer technologies (e.g. local area networks, stand-alone, mini-based, multi-functional, integrated learning systems, distance learning technologies) and provided state aid for technology applications based on a limited awareness of the state of the art as it was defined in the 1960's. Also, the laws, regulations, and institutional mechanisms of providing state aid did not anticipate that new inter-institutional

arrangements amongst educational and cultural institutions would need to be forged if the new technologies were to be acquired in a cost-effective manner that addresses a variety of applications across educational/cultural sectors. Finally, the laws and regulations related to the provision of state aid to enhance the shared acquisition and use of technologies by local schools originally required that the aid be provided through intermediate institutions (those institutions functioning as "arms" of the Department of Education at a local level). Unfortunately, a 1960 interpretation of what constitutes a "shared" technology resource amongst schools was that the technologies needed to be linked by telecommunications to the intermediate agencies in order to receive aid for cooperatively sharing the technology. New technologies do not require telecommunications linkages and, moreover, there needs to be a mechanism for providing shared services aid directly to local schools and not through intermediate agencies.

Within the context of this complex set of issues related to the provision of state aid to local schools for technology acquisition and the sharing of those resources for enhanced efficiency, the Regents Advisory Council on Learning Technologies recommended that a major study of state aid be undertaken and that particular attention should be given to:

- Equitable financial incentives for both shared service technology applications and those locally viable technology applications not currently benefitting from cooperative service aid.
- Capacities and costs of future technologies.
- Optimal use of technologies.
- Flexibility for local determinations related to technology acquisition and application.
- Encouragement of maximum sharing through a number of multiple local district arrangements which allow for participation of postsecondary and cultural institutions.
- Support of innovative applications and elimination of policies that provide local financial disincentives for securing more advanced and efficient technologies.

2. There must be a minimal level of technology competency required in teacher preparation and inservice programs. Although there have been significant activities undertaken in the State to provide a major inservice delivery network to train K-12 teachers on the use of technologies, there needs to be a major effort related to technology training at the preservice level and a coherent, unified strategy to articulate both preservice and inservice programs. Consequently, the Regents Advisory Council on Learning Technologies recommended that teacher preparatory programs include exposure to the technologies for new teachers and that additional consideration must be given to the following in the planning of the programs:

Recommendation 11. Enhance Access to Effective Application of Learning Technologies

- The Center's videotape library of more than 1,500 programs has been substantially increased by the addition of 125 new programs. Efforts to expand access to these programs, particularly for institutions serving low-wealth and minority populations, have been intensified by acquiring distribution rights for quality programming at reduced cost and by acquiring programming specifically targeted at the learning needs of low-wealth, minority, and special populations. Currently, the Center is distributing approximately 270 programs per month. More than 3,200 video programs were distributed through the Media Distribution Library since April 1985.

- The Teacher Resource and Computer Training Center (TRCTC) program, which was expanded from a $3.5 to a $6 million appropriation during the 1985-86 school fiscal year, is a primary statewide inservice network for providing staff development, planning, and technical assistance related to the technologies to school districts and BOCES. Currently, 56 TRCTCs have been funded through a competitive grant program. Inservice has been provided to more than 160,000 teachers. The Center for Learning Technologies, cooperating with the Division of Teacher Certification, reviews proposals, reviews and approves budget items associated with the learning technologies, and encourages the Centers to enhance efforts to provide effective staff development on the educational applications of learning technologies. $10 million has been appropriated for the TRCTC program for the 1986-87 year.

These illustrations indicate the wide range of technology initiatives undertaken by the Department. Other major initiatives include the 1984-87 state aid allocation for the purchase of computer hardware by the public schools, which totals $31.2 million for 1984-87, and the provision of special aid for public and nonpublic school district acquisition of computer software, which totals $25.5 million for the same period.

Telecommunications and Distance Learning Technologies

Of all the technology programs and initiatives which have been implemented since the May 1985 approval of the plan, it is the emergent role of the telecommunications technologies for "distance learning" which holds major promise for providing enhanced learning opportunities with equitable access for all in an efficient and cost-effective manner. Telecommunications planning and implementation was one of the major Regents recommendations addressed in the plan. During the 1985-86 school year, there was a major implementation across the State of several distance learning networks. The Center for Learning Technologies gathered information on twenty-six distance learning projects, which were jointly undertaken by school districts, BOCES (intermediate agencies), and postsecondary institutions. The projects

were initiated to address the needs of small schools with limited resources and declining enrollments to offer enhanced learning opportunities for students. Nine projects are currently operating, using either cable, microwave broadcast, or telephone-based systems, to link a master teacher and a class (5-6 students) in one school to small numbers of students in classes in other remotely situated schools. The networks, which provide both two-way audio and visual interaction, as well as the exchange of data, are offering courses in calculus, astronomy, second language instruction, and economics. The remaining seventeen projects are engaged in significant planning activities and are exploring the potential application of satellite-based delivery systems. The twenty-six projects involve nearly one-half of the school districts and 42 BOCES. It is expected that all school districts and BOCES will be involved in distance learning activities by the end of the next year.

One of the many reasons which can be given for the rapid emergence of distance learning activities is that the State is rich in several extant broadcast telecommunications networks that are being efficiently used to deliver instruction remotely and interactively. These capacities, which form the backbone of a common telecommunications or "distance learning" "highway," include the following:

- There exists a statewide public broadcasting television and radio network, comprised of nine public television stations and nearly 60 public radio stations, linked together through microwave and FM broadcasting. All television stations have downlink capacity and full upstream and downstream capacity. All radio stations have both uplink and downlink capacities. Currently, projects are underway to expand these "highways" by pilot testing of the distribution capacity of the aural subchannel of the public broadcasting television signal for data transmissions and the FM Subcarrier Authorization (SCA) for software distribution. Also, the public television stations are exploring the potential of transmission of data via the video blanking interval (VBI) capacity.

- Several years ago Center engineers installed more than 100 translator systems throughout the Southern Tier of New York State. The translators, originally installed to "boost" the public television signal over mountainous terrain, are operated by the BOCES who hold FCC licenses to potentially allow for the operation of these translators as low power television stations. Significantly, the translators (low power television stations) are "gatewayed" into the microwave network which, in effect, links them with the public television and radio station network.

- A major closed circuit television network is operated by the nonpublic schools throughout Long Island, New York City, and downstate New York. The network, with 4 audio and 4 television channels, is linked to the microwave network, and is delivering television programming daily to nearly 450 schools.

- There are more than 600 cable companies in New York State. Although regulations requiring them to make available two channels for public access programming was relaxed two years ago, there is a current effort underway to revise the regulations to require the companies to offer two-three public access channels. Significantly, all of the cable companies are "gatewayed" into the microwave network and, thereby, provide additional interconnected telecommunications capacities that are supporting distance learning.

- Data gathered by the Department's Information Center on Education on video-based and telecommunications technology acquisition and installation in the total public/nonpublic schools of the State for 1985-86 reveal a major technology capacity to support distance learning. For example, the total public/nonpublic schools had acquired 15,729 video cassette recorders, which represents a 43 percent increase over the preceding year. The data shows that the total schools had an installed base of 42,222 television monitors, had acquired nearly 100 satellite earth stations or dishes during that single year alone, and that over 71,000 teachers were currently using video as a tool of instruction. More than 2,500 schools had cable network installations and 4,234 of the total 6,287 schools have receive capability of public television programming.

Selected Distance Learning Projects

A brief review of three current distance learning projects will serve to illustrate the range of technologies employed, the nature of the programming and curriculum provided, and the mix of funding sources involved.

- Educational Telecommunications in Small Rural Schools. The project, which is operated by the Delaware-Chenango BOCES and interactively links together eighteen school districts separated by many miles, was implemented (1) to establish an ongoing State and local program for assessment of ways to strengthen rural education via telecommunications and (2) to provide equitable educational opportunities to schools in rural areas of Delaware and Chenango counties via two-way interactive computer technology. The project was initially funded for $145,000 from a variety of sources - Federal Government, State Education Department, local BOCES, AT&T, IBM, and a Special Legislative Grant. The technology employed was an interactive voice and PC-based graphics system. Networking occurred via the Alliance Teleconferencing service. Terminal hardware included an IBM-PC based OPTel Telewriter II-PC, which provided for two-way voice and graphics in a real-time interactive mode using a PC-based computer system. Pilot curriculum tests of Astronomy, 9-12th grade and AP Calculus, were conducted respectively beginning in May and September, 1985.

- Technology training must be an integral part of the entire teacher preparatory program as opposed to a separate course of study; the technologies should be infused within all elements of the preparatory program.

- The concept of technology should be broadened to include all of the technologies and not limited to the computers.

- In the planning and development of the technology components for a teacher preparatory program, consideration must be given to the concurrent development of follow-up inservice programs operable throughout a teacher's entire career.

- Information on technology requirements for teacher training should be gathered from other States to inform the considerations and policy development of the Department.

In addition to the above, the major policy review activities of the Department of Education will focus in the immediate future on (1) statewide planning of distance learning activities, (2) formulation of policy guidelines related to public-private partnerships with the technology industry, and (3) applying technologies to resolve constraints imposed by a recent Supreme Court decision ruling that Chapter I funded public school teachers cannot render instructional services in nonpublic schools. These issues, and others, will require that State Educational Agencies exercise effective leadership and creativity in formulating new laws and policies that enhance, rather than inhibit, both the infusion of new technologies within the educational system and the capacity of formal educational institutions to respond to new learning needs of a citizenry.